Pharmaceutical Sciences and Research (PSR), 5(2), 2018, 49 - 57

The Development of a Questionnaire on Factors Affecting Non Adherence Behavior among Indonesian Elderly Population

Andi Makkulawu[1,2], Adji Prayitno Setiadi[3,4*], Tri Budi Wahyuni Rahardjo[5], Eko Setiawan[3,4]

[1]Master of Pharmacy Program, Faculty of Pharmacy, Universitas Surabaya, Surabaya
[2]Department of Pharmacy, M.M. Dunda Hospital, Limboto, Gorontalo
[3]Department of Clinical and Community Pharmacy, Faculty of Pharmacy, Universitas Surabaya, Surabaya
[4]Center for Medicines Information and Pharmaceutical Care (CMIPC), Faculty of Pharmacy, Universitas Surabaya, Indonesia
[5]Center for Aging Study, Universitas Indonesia, Jakarta

ABSTRACT

Instruments which can be used to identify factors affecting the medication adherence of elderly with diabetes mellitus (DM) have not been discovered in Indonesia. The objective of this study was to develop a questionnaire to identify factors affecting elderly patients' medication adherence. The development of the questionnaire was conducted based on published references attained through the exploration of research evidence with several keywords and databases. Content validity was conducted using experts' assessment (two experts). Face validity was conducted in 13 subjects including seven (7) non-elderly subjects and six (6) elderly subjects. Construct validity test was conducted based on calculated R against table R while reliability test was conducted with *Cronbach's Alpha*. There were 30 elderly subjects included in the construct validity. Present study produced a valid and reliable questionnaire comprising 35 questions in 14 subcategories from 4 factor domains with the calculated R = 0.357-0.788 and *Cronbach's Alpha* = 0.934. The questionnaire can be used for further research throughout Indonesia. Hence, a complete overview of factors affecting elderly DM patients' medicine consumption adherence can be obtained. The identification of factors related to the usage of DM patients' medicine is expected to serve as a base for the government, both of state and local government, to produce policies related to health interventions to be implemented.

ARTICLE HISTORY

Received: January 2018
Revised: April 2018
Accepted: July 2018

***Keywords**: questionnaire; adherence; elderly; diabetes mellitus*

*corresponding author
Email: adji_ps@hotmail.com

INTRODUCTION

The increase of elderly population may result in various issues in a country, and one of the greatest impacts is the escalated issues in health. The need for health services for the elderly is more complex, considering the differences in the physiological and psychological condition of elderly than young adults. Other than being more complex, the need for health services is greater than the young adults considering the high number of chronic illnesses within the group (Canadian Institute for Health Information, 2011).

Diabetes mellitus (DM) is a chronic disease often suffered by the elderly (Bethel *et al*., 2007; Kirkman *et al*., 2012). Diabetes mellitus is marked with disruptions in the glucose level regulation in the blood that may further impact to the development of complications, namely: macrovascular and microvascular complications. Diabetes complications may eventually contribute to the increase of adverse effects both in clinical or financial perspective. Research results showed that the death rate caused by DM increases each year along with the occurrence of complications in DM patients (Bethel *et al*., 2007). Financially, required health budget to care for DM patients with complications is greater compared to those without complications (Li *et al.*, 2013). Hence, the prevention of complications has to be pursued as optimally as possible to reduce the number of DM patients with complications.

One of the keys to preventing DM complications is a regular usage of medicine (Wild, 2012). Ironically, DM patients' adherence to taking medicine is reportedly very low and varies from 38.5% to 93.1% (Krass *et al.,* 2015). The research which was done in Indonesia setting also showed the same results. Cahyadi *et al.* conducted a research concerning the adherence in taking medicine in the elderly population in East Surabaya region in 2014 and showed a relative high level of non-adherence in elderly patients suffering from DM in East Surabaya, with the percentage of non-adherence patients amounting to 87.93% (Cahyadi, 2015). The high level of non-adherence behavior in the elderly needs interventions as an effort to minimize complications which eventually result in the squander of health budget which could be prevented.

Non-adherence issue may contribute to the rise of budget expended by a country's healthcare system. In 2012 in the United States of America, approximately $2.7 trillion of health cost was expended by the government to handle health issues which ironically amounted to less than 8.00% of the total health cost, or $213.2 billion could have been saved. One of the sources of saving was from the issue of non-adherence, amounting to $105.4 billion out of the total component. One of the diagnosis of illnesses with high non-adherence potential is DM. In the USA, non-adherence behavior in DM patients contributed to the squander of state budget amounting to $24.6 billion (IMS Institute for Healthcare Informatics, 2013). Considering the potential health costs to be expended due to relatively high non-adherence and potential non-adherence behavior occur in elderly DM patients, appropriate interventions are required to tackle this unintended behavior. The choice of intervention must be appropriate and customized to the cause of patients' non-adherence.

Factors affecting adherence behavior may differ among regions and/or patient population. A research conducted in Australia revealed factors causing the elderly to be non-adherence were as follows: side effects, poly pharmacy, all-day travel, forgetting to take medicine, difficulty in reading the labels and opening the containers, confusion with medicine dosages, lack of explanation on the medication, different information between the prescriber and the pharmacist and between one prescriber and another, and the conflict between the prescriber and the pharmacist (Elliott, 2006). Another research conducted in India, involving 150 elderly patients with type 2 DM, stated that factors affecting patients' non-adherence were illiteracy, economic issues, no information regarding the usage of medicine, and nescience of what will occur should the medicine is stopped, the inability to go to the doctor's for continuous consultation, no given advice to exercise regularly, and no advice to go on a diet (Divya & Nadig, 2015).

Until now, no research with the goal to identify the causes of non-adherence in elderly patients with DM has been found in Indonesia. If the causes of non-adherence are not definitely known, it is feared that inappropriately on-target interventions will be designed. Moreover, if the inappropriate interventions are implemented, the health cost burden will increase without solving the problem. One of the reasons why factors affecting non-adherence behavior in the elderly in Indonesia have not been identified is the absence of valid and reliable tools.

This research aimed to develop a valid and reliable questionnaire to identify factors affecting the medicine consumption adherence in elderly patients. The questionnaire developed in the research was a tool to identify factors affecting adherence behavior elderly patients who consume antidiabetes oral medicine and was aimed for the elderly able to speak Indonesia. The questionnaire was not intended for patients who use insulin. The potential benefit of developing this questionnaire is to map the drivers of adherence among elderly patients that can be used to develop an appropriate intervention.

METHOD

The research had attained approval from *Dinas Kesehatan Kota Surabaya* No. 072/16842/436.6.3/2015. The development process of the questionnaire was conducted within a 5-month period, commenced by identifying factors affecting adherence behavior of elderly with DM from published references. The literature search was conducted from June to August 2015 in *Pubmed* and *Cochrane* databases using combined keywords: factors, adherence, nonadherence, compliance, noncompliance, diabetes mellitus, geriatric, old-age, elderly, and Indonesia. Only articles in English will be further analyzed. Other than using the two databases, the literature search process was also conducted in Indonesian journals, namely Indonesian Journal of Pharmacy, JFI Online, Indonesian Journal of Clinical Pharmacy, and Calyptra. The literature search in the Indonesian language was also conducted using Google and Universitas Surabaya's library database using keywords *faktor*, *patuh*, *ketidakpatuhan*, *lanjut usia*, *lansia*, and diabetes mellitus.

The inclusion criteria for research articles used as the basis of the development of the questionnaire were: a) exposing the theme of factors affecting adherence behavior in taking medicine in elderly DM patients, b) qualitative or quantitative research with observational and experimental design, c) in English or Indonesia. A research in the form of expert opinion was not used in this research.

The research on non-adherence factors was approached using adherence variables. Factors found in the research results regarding the elderly DM patients' adherence in taking medicine were subsequently grouped into several categories and sub categories. Two to 10 questions were developed for every sub category. The questions were positive (favorable question) and negative (unfavorable question). Each question had 5 answer options, as follows: highly disagree (5 points), disagree (4 points), not quite agree (3 points), agree (2 points), highly agree (1 point).

Upon the development of the questions in the questionnaire, validity and reliability test were conducted on the questions. The validation process

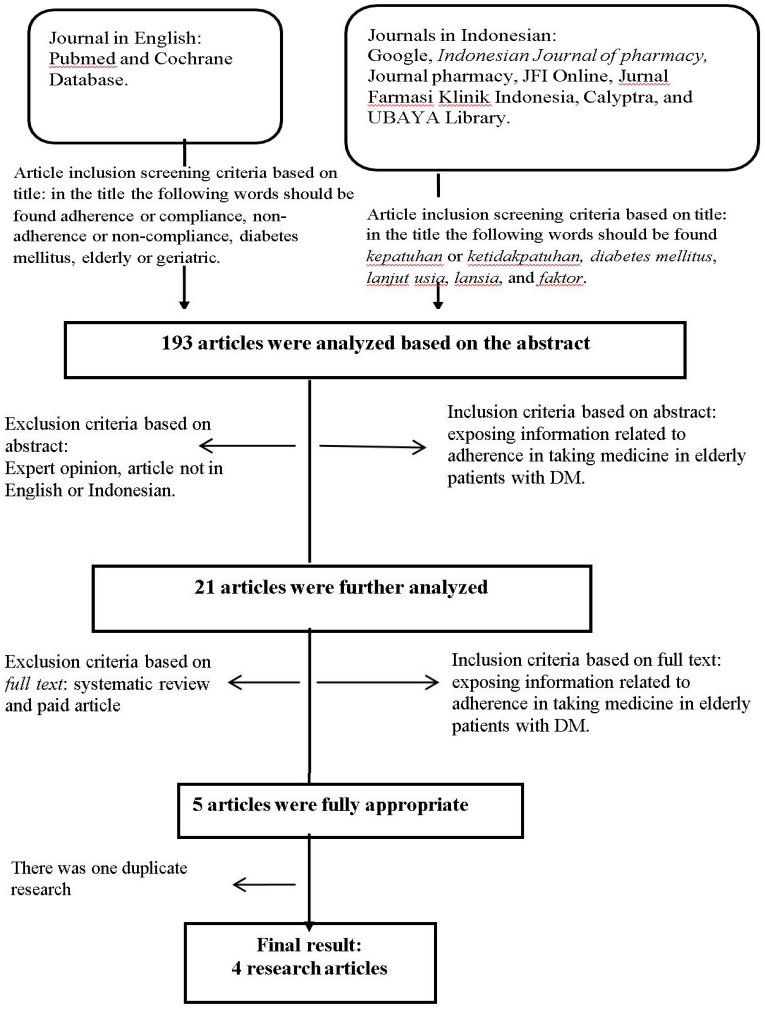

Figure 1. The Screening Flow of Research Articles of The Factors Affecting Adherence in Taking Medicine in Elderly DM Patients

comprised of content validity which was conducted with the help of an expert, while face validity, and construct validity conducted on several respondents with different backgrounds. Other than involving elderly respondents, face validity test in this research also involved the non-elderly group as an effort to maximize validity test results. Information regarding the study was provided for respondents before asking them to fill out the questionnaire. Respondents were given an informed consent form and they might choose to sign or to provide a thumbprint. Construct validity test analysis was conducted using Spearman correlation test. A statement was considered valid if the value of calculated R≥ R table. Reliability test analysis in this research was conducted using *Cronbach's alpha* test. *Cronbach's alpha* value of >0.8 was used as the limit to identify the reliability of the questionnaire. Validity and reliability test of the questionnaire in this research was processed using SPSS 20.0 Windows version.

RESULTS AND DISCUSSION

There were 4 published research articles used as the basis for the development of the questionnaire. The screening flow related to factors affecting the adherence to taking medicine in the elderly was depicted in Figure 1. Identified factors from the references were later grouped into 2 factor domains, namely: internal factor domain and external factor domain. The classification into 2 major domains was based on behavior theory developed by Kelley (1971) that in essence, adherence behavior is affected by two interrelated factors namely internal factors and external factors (Kelley, 1971). Internal factors are factors from within oneself in a state of consciousness which may affect one's behavior, and external factors occur when the environment or circumstances affect one's behavior (Jane, 2007). The classification of factors into internal or external was conducted so that the factors found could easily be associated with the parties

Table 1. Construct Validity For The 61 Statements of The Questionnaire

Question number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Corrected item-total correlation	0.013	0.334	0.618	0.434	0.688	0.624	0.602	0.603	0.609	0.477	0.580	0.602	0.441	0.403	0.387
Question number	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Corrected item-total correlation	0.597	0.540	0.557	0.479	0.612	0.533	0.613	0.674	0.245	0.572	0.387	0.341	0.129	0.259	0.461
Question number	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
Corrected item-total correlation	0.408	0.767	0.630	0.303	0.369	0.455	0.297	0.404	0.245	0.518	0.562	0.596	0.495	0.345	0.069
Question number	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**
Corrected item-total correlation	0.495	0.615	0.456	0.497	0.338	0.181	0.594	0.305	0.176	0.507	0.281	0.404	0.290	0.433	0.593
Question number	**61**														
Corrected item-total correlation	0.265														

Calculated R less than R table

in need of intervention, namely: patients or non-patients. Without the identification of those factors, in general, the patients are the scapegoat as the lead actor of non-compliant behavior in medication, and consequently, will be the main target of the interventions. If, in reality, external factors are more influential, then interventions on patients will not result in any improvements and conversely, this tends to squander national health budget.

The internal and external factor domains were later developed into several categories and sub categories. Internal factors were divided in 2 categories, as follows: patient factors (comprising 7 sub categories) and illnesses factors (comprising 2 sub categories). External factors were also divided in 2 categories, namely: health services (comprising 3 sub categories) and socio-economic (includes 3 sub categories). More detailed categories and sub categories were made by considering the mapping factors of adherence behavior developed by World Health Organization (WHO) that groups medication adherence behavior into 5 groups, namely patient factors, medication-related factors, illnesses-related factors, health services system-related factors, and social-economy-related factors (World Health Organisation, 2003).

At the end of the questionnaire development process, nine and six sub categories for internal and external factors were attained, respectively. There were two up to 10 questions in each sub category. The early design of the questionnaire comprised 59 statements. The statements were perfected through the validation process of the questionnaire. Two statements adjusted to elderly DM patients' condition in Indonesia were added upon completion of face validity and content validity test conducted with expert opinion (two experts), hence the design of the questionnaire with 61 questionnaire statements was obtained.

The early design of the questionnaire with 61 statements was tested in terms of face validity on three non-elderly respondents, in this case, college students. The aim of this process was as an effort of early stage identification of the comprehensiveness of each statement. If students, who are generally more well-educated have difficulties, it was feared that it would be more difficult for the elderly to comprehend the statements. Respondents provided a number of inputs to improve the questionnaire. After the questionnaire had been improved, another face validity test was re-conducted on four non-elderly DM respondents, in this regard, comprising student, lecturer,

Table 2. The Final Questionnaire of Factors Affecting Medicine Consumption Adherence In Elderly DM Patients

No	Statements	Highly Agree	Agree	Do Not Quite Agree	Dis-agree	Highly Dis-agree
1	*Pola makan saya tidak teratur sehingga saya merasa tidak perlu minum obat kencing manis.*					
2	*Saya merasa perlu minum obat. ketika hanya saya makan secara berlebihan saja.*					
3	*Saya percaya bahwa tanpa minum obat kencing manis. komplikasi penyakit saya tidak akan terjadi.*					
4	*Saya tetap merasa lebih baik walaupun saya tidak minum obat kencing manis.*					
5	*Saya merasa kesulitan mengikuti petunjuk pengobatan jika jumlah atau jenis obat selalu diganti.*					
6	*Harapan saya terhadap manfaat penggunaan obat kencing manis tidak sesuai dengan kenyataan.*					
7	*Saya merasa membuang waktu yang lama ketika berobat di tempat layanan kesehatan.*					
8	*Saya merasa tidak puas dengan pelayanan kesehatan yang diberikan.*					
9	*Saya takut bertemu dan berbicara dengan petugas kesehatan.*					
10	*Saya tidak perlu khawatir tentang penyakit kencing manis karena akan membaik dengan sendirinya.*					
11	*Saya tidak perlu lagi mengkonsumsi obat kencing manis jika kondisi saya membaik.*					
12	*Saya sering kali lupa jadwal minum obat.*					
13	*Saya tidak senang mengkonsumsi obat kencing manis karena sangat membosankan.*					
14	*Saya merasa stress jika harus minum obat terus menerus.*					
15	*Saya memiliki kesulitan untuk mengambil obat di sarana kesehatan.*					
16	*Kemampuan saya untuk melihat sudah berkurang sehingga tidak dapat membaca aturan pakai obat dengan jelas.*					
17	*Kemampuan saya untuk mendengar sudah berkurang sehingga tidak dapat mendengar informasi obat dengan jelas yang diberikan.*					
18	*Saya merasa tidak perlu minum obat karena kondisi penyakit saya baik-baik saja.*					
19	*Saya tidak dapat minum obat kencing manis karena penyakit saya bertambah parah.*					
20	*Saya hanya minum obat ketika merasa sering buang air kecil. haus. ataupun lelah.*					
21	*Saya merasa tidak perlu minum obat karena saya masih dapat bekerja sehari-hari.*					
22	*Akses menuju tempat mendapatkan obat atau layanan kesehatan jauh dan sulit dijangkau.*					

No	Statements	Highly Agree	Agree	Do Not Quite Agree	Dis-agree	Highly Dis-agree
23	*Tempat berobat yang dituju sulit ditemukan.*					
24	*Waktu yang dibutuhkan untuk menebus obat terlalu lama.*					
25	*Tenaga kesehatan tidak memberikan perhatian khusus terhadap kekhawatiran yang saya rasakan akibat menderita kencing manis.*					
26	*Tenaga kesehatan tidak memberikan penjelasan dengan jelas dan mudah dipahami oleh saya.*					
27	*Tenaga kesehatan tidak memberi kesempatan kepada saya untuk bertanya kembali tentang hal-hal yang belum dipahami.*					
28	*Saya tidak mengerti dan tidak bisa memahami dengan baik alat bantu yang diberikan oleh tenaga kesehatan.*					
29	*Saya merasa kurang nyaman jika dosis obat selalu dikurangi atau ditambah.*					
30	*Saya tidak mendapatkan informasi pendukung tentang obat seperti brosur.*					
31	*Saya merasa segan untuk bertanya informasi terkait obat pada petugas kesehatan.*					
32	*Seharusnya ada seseorang yang mengingatkan ketika saya mulai tidak patuh minum obat.*					
33	*Saya tidak dapat minum obat karena harga obat terlalu mahal.*					
34	*Saya tidak dapat minum obat karena pendapatan saya tidak cukup untuk membeli obat secara rutin.*					

technical consultant, and housewife. Based on the input from the face validity test, the questionnaire was ready to be tested on elderly patients with DM. In total, six elderly with various education levels in the regions of Kalirungkut and Tenggilis Mejoyo were involved in the face validity test in this research.

After the face validity test had been conducted, the next step was to construct validity test that aimed to observe the performance of the questionnaire in measuring the construct. The value of corrected total-item correlation for each statement was used as the indicator of construct validity. A statement was deemed valid when the value of corrected total-item correlation > from R table (Field, 2009). Construct validity test for the 61 statements of the questionnaire was performed on 30 elderly DM patients in the city of Surabaya. Based on the reference, R table for Spearman correlation test on 30 respondents was 0.306 with the significance of 0.050-0.100. There were 6 and 8 statements in internal and external factor domains, respectively, with the value of Calculated R less than R table, hence were removed from the questionnaire (Table 1). In total there were 47 statements resulting from construct validity test which was further analyzed through reliability test.

Reliability test on this research utilized Cronbach's Alfa test. The reliability of the questionnaire showed that the questionnaire used was consistent in measuring the same constructs. The reliability test of the questionnaire can be described in a number of ways, namely: test-retest, parallel reliability, and internal consistency reliability. Test-retest of the reliability of instruments obtained from the repeated measurement. Every subject is given the same test minimum twice. Parallel reliability test is two tests with identical objectives, difficulties, and organization, but with different questions items. Whereas internal consistency reliability is reliability obtained from the testing of the consistency of subjects' responses in a measurement tool in a measurement. In the commencement of the research, the respondents were elderly patients who most probably had difficulties in filling in the questionnaire twice due to their physical condition, forgetfulness, and so forth. Hence, the implementation of test-retest and parallel test was highly potential to fail. The most appropriate and possible reliability test to apply was internal consistency. Internal consistency reliability can be depicted by *Cronbach's alpha* (Riwidikdo, 2013; Kimberlin & Winterstein, 2008).

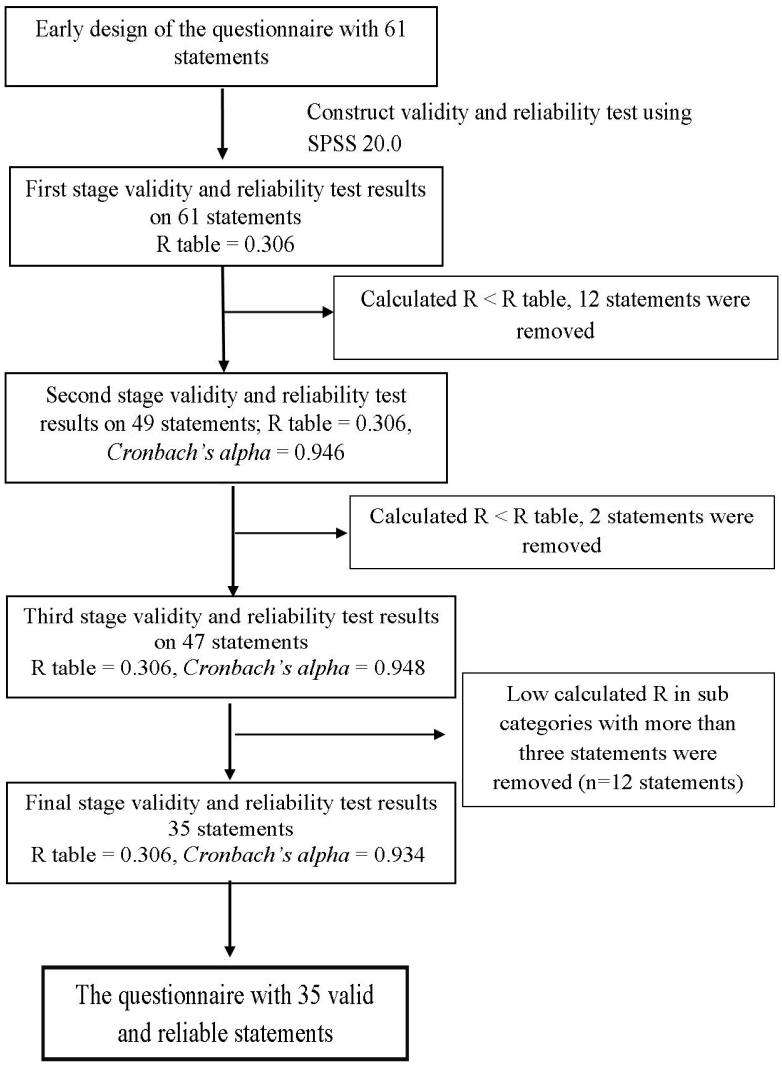

Figure 2. The Flow of Construct Validity and Reliability Test on The Questionnaire of Factors Affecting Medicine Consumption Adherence in Elderly DM Patients

Cronbach's Alpha value for 47 questionnaire statements was 0.948. According to reference, if *Cronbach's Alpha* value is < 0,500 then the questionnaire is classified as having low reliability, *alpha* between 0.500-0.700 has moderate reliability, *alpha* between 0.700-0.900 has high reliability, and if *alpha* is >0.900 then it has perfect reliability (Field, 2009). Another reference states that *Cronbach's Alpha* value of 0.7 is the minimum value of a measurement tool to be deemed as a reliable measurement tool (Tavakol & Dennick, 2011). Considering the reliability threshold based on *Cronbach's Alpha* test, it can be concluded that *Cronbach's Alpha* value in the questionnaire developed in this research was acceptable.

Despite having good and acceptable *Cronbach's Alpha* value, the number of statements in the questionnaire which totals to 47 statements was considered too many for the elderly. Hence, the researcher attempts to express statements in domains with more than three statements by leaving three to four statements with the value of the highest calculated R (corrected item-total corelation in the table pivot). There were six, two, four, and four statements in the sub categories belief in medicine, belief in illnesses, medical staff, and product, respectively, were excluded from the questionnaire. Sub categories with ≤ three statements did not experience statement exclusion, namely: meal habits, belief in health services, emotional factors, physical, perceived symptoms, complications, facilities, social support, and communal culture. The change in the number of statements potentially reduces the value of *Cronbach's alpha* (Field, 2009). The researcher conducts a retest of *Cronbach's alpha* for the remaining 35 statements and *Cronbach's Alpha* value of 0.934 was obtained. The flow of construct validity test and reliability test of the questionnaire could be seen in Figure 2. The valid and reliable final results of the questionnaire could be seen in Table 2, whereas domain matrices and statements could be seen in Table 3.

Table 3. Domain Matrices and The Questionnaire Statements of Factors Affecting Medicine Consumption Adherence in Elderly Patients with Diabetes Mellitus

Categories	Internal Factors	
	Sub categories	**Statements No.**
Patient factors	Meal habits	1, 2
	Belief of medicine	3, 4, 5, 6
	Belief of health services	7, 8, 9
	Belief of illnesses	10, 11
	Emotional factors	12, 13, 14
	Physical	15, 16, 17
Illnesses factors	Complications	18, 19
	Perceived symptoms	20, 21

Categories	External Factors	
	Sub categories	**Statements No.**
Health services	Facilities	22, 23, 24
	Medical Staff	25, 26, 27
	Product	28, 29, 30, 31
Social-economy	Social support	32
	Cost	33, 34
	Communal culture	35

The valid and reliable questionnaire resulting from this research was the first questionnaire to identify factors affecting medicine consumption adherence in elderly DM patients in Indonesia setting. There were a number of published researches with the aim of identifying factors affecting medication adherence in elderly DM patients (Saifunurhamzah, 2013; Cahyadi, 2015). Both researches used qualitative method through in-depth interview on DM patients. The usage of a qualitative method has limitations in identifying the domination of certain factors quantitatively. The limitations will result in the government's inability to implement the appropriate intervention to improve non-compliant behavior.

There were several other questionnaires generally used in published research regarding compliance. However, the questionnaire was used to determine the adherence level of a patient in using medicine, namely Morisky scale questionnaire, Medication Adherence Rating Scale (MARS), Adherence Refill and Medication Scale (ARMS), and self-reported measurement (Bethel *et al*., 2007; Kirkman *et al*., 2012). The questionnaire was solely used to determine whether a patient was adherence or non-adherence in the medication without identifying factors contributing to the behavior. The existence of the questionnaire able to identify factors causing non-adherence, as resulted by this research, when applied together with the questionnaire measuring adherence level is expected to contribute in providing a complete and vast overview in medicine consumption behavior in Indonesia. However, the application of the questionnaire resulted in this research has several limitations, as follows: the questionnaire cannot be used on patients who do not comprehend Indonesia and not tested for self-administered.

CONCLUSION

This research resulted in a questionnaire to identify the dominant factors causing adherence and/or non-adherence behavior in a valid and reliable manner. In total, there were 35 statements representing internal and external factor domains. The questionnaire could be used as a further research throughout Indonesia, thus a complete overview regarding factors affecting medicine consumption adherence in elderly DM patients could be obtained. The identification of factors attributing to the non-adherence behavior as a quantitative data was expected to serve as a basis for the government, whether state or local government, in making policies related to health intervention to be applied. Further research related

to self-administered questionnaire needs to be conducted in order to assess the feasibility of the self-administered method. Moreover, considering the possibility of elderly patients who do not understand Indonesian, the translation of the language of the questionnaire to local language along with language validation need to be conducted as an effort to optimize the identification process of the causes of the medicine usage behavior nationally.

REFERENCES

Adherence to long-term therapies: evidence for action. (2003). Switzerland: World Health Organization.

Avoidable cost in U.S. Healthcare: the $200 billion opportunity from using medicines more responsibility. (2013). Retrieved from IMS Institute for Healthcare Informatics website: http://www.imshealth.com/files/web/IMSH%20Institute/Reports/Avoidable_Costs_in%20_ US_Healthcare/IHII_AvoidableCosts_2013.pdf

Bethel MA, Sloan FA, Belsky D, Feinglos MN. (2007). Longitudinal incidence and prevalence of adverse outcomes of diabetes mellitus in elderly patients. *Archives of Internal Medicine*, 167, 921-7.

Cahyadi H. (2015). Profil, faktor penyebab, dan pembuatan *patient decision aids* perilaku non-adherence pada pasien diabetes mellitus geriatric di puskesmas wilayah Surabaya Timur [Master degree thesis]. Surabaya: Universitas Surabaya.

Divya S, & Nadig P. (2015). Factors contributing to non-adherence to medication among type 2 diabetes mellitus in patiens attending tertiary care hospital in South India. *Asian Journal of Pharmaceutical and Clinical Research*, 8(2), 274-6.

Elliott RA. (2006). Problems with medication use in the elderly: an Australian perspective. *Journal of Pharmacy Practice and Reserch*, 36(1), 58-66.

Field A. (2009). *Discovering Statistics Using SPSS 3rd ed*. New Delhi: Sage Publications.

Health care in Canada, 2011: focus on seniors and aging. (2011). Retrieved from Canadian Institute for Health Information website: https://secure.cihi.ca/free_products/ HCIC_2011_ seniors_report_en.pdf

Jane O. (2007). *Health Psychology: a textbook 4th ed*. Berkshire: Open University Press.

Kimberlin CL, & Winterstein AG. (2008). Validity and reliability of measurement instruments used in research. *American Journal of Health-System Pharmacy*, 65, 2276-2284.

Kelley HH. (1971) Attribution: Perceiving the Causes of Behavior. New York: General Learning Press.

Kirkman MS, Briscoe VJ, Clark N, Florez H, Haas LB, Halter JB, et al. (2012). Diabetes in older adults. *Diabetes Care*, 35, 2650-2664.

Krass I, Schieback P, Dhippayom T. (2015). Adherence to diabetes medication: a systematic review. *Diabetic Medicine*, 32(6), 725-737.

Li R, Bilik D, Brown MB, Zhang P, Ettner SL, Ackermann, R.T., Crosson, J.C., et al. (2013). Medical costs associated with type 2 diabetes complications and comorbidities. *The American Journal of Managed Care*, 19(5), 421-430.

Riwidikdo H. (2013). *Statistik Kesehatan Dengan Aplikasi SPSS dalam Prosedur Penelitian*. Rohima Press: Yogyakarta.

Saifunurmazah D. (2013). Kepatuhan penderita diabetes mellitus dalam menjalani terapi olahraga dan diet [Bachelor degree final project]. Semarang: Universitas Negeri Semarang.

Tavakol M, & Dennick R. Making sense of Cronbach's alpha. (2011). *International Journal of Medical Education*, 2, 53-55.

Wild H. (2012). The economic rationale for adherence in the treatment of type 2 diabetes mellitus. *The American Journal of Managed Care*, 18 (3 Suppl), S43-S48.